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10/697,394	10/30/2003	Simon Dodd	100203969-1	7466

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EXAMINER	
PERT, EVAN T	

ART UNIT	PAPER NUMBER
2826	

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/697,394	DODD ET AL.	
	Examiner	Art Unit	
	Evan Pert	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) *27-46* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20 and 23-26* is/are rejected.

7)☒ Claim(s) *21 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-26 in the reply filed on July 7, 2006 is acknowledged. Claims 27-46 are withdrawn from consideration as being drawn to non-elected inventions.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3, 6, 7, 11-13, 15-19, and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Caldwell (US 5,401,691).

Regarding claim 1, the '691 patent discloses a target (i.e. alignment mark) formed on a substrate (300) comprising: a first layer (320) deposited below a second layer (332) on the substrate (300), the second layer (332) deposited below a third layer (340) on the substrate (300), the first layer (320) having a topographic contour formed thereon (i.e. formed thereon by the chosen contour of underlying 318, e.g.), the first layer at least partially projecting a patterned topographical contour through the second layer to the third layer (i.e. the indent is projected from each underlying layer upward).

Regarding claims 2 and 3, the optical characteristics of the patterned portions of both first layer (e.g. 320) and third layer (e.g. 340) "differ" from the portions surrounding the patterned portions, inherently, since the patterned portions can be distinguished optically with alignment optics.

Regarding claim 6, the first layer 320 is polysilicon and the patterned topographical contour of the configuration of polysilicon 320 causes the result of contour in the third layer 340.

Regarding claim 7, the layers are deposited on the die (i.e. IC area 302) and outside the IC area (i.e. alignment mark area 308).

Regarding claim 11, the second layer includes an electrical conductor (i.e. metal layer 332 is the second layer and this layer is metal so this layer "is an electrical conductor")

Regarding claim 12, "wherein electrical current flows through" is taken to mean "wherein electrical current is capable of flowing through" so first layer is polysilicon and current is capable of flowing through polysilicon.

Regarding claim 13, the substrate 300 is segmented into an electrically functional portion (i.e. IC area 302) and an electrically non-functional portion (i.e. alignment mark area 308).

Regarding claim 15, transparent layer 336 can be provided over the patterned topographical contour.

Regarding claim 16, each layer has portion that is recessed, for optical detection.

Regarding claim 17, there are different heights in an out of the indent.

Regarding claim 18, there is a central region (i.e. central depression) and a surrounding contrasting portion (i.e. the part that is not a depression).

Regarding claim 19, the contrasting region includes the pattern of the topographical contour.

Regarding claim 23, the '691 patent discloses a method of manufacture of a target (i.e. an optical alignment mark), comprising: depositing a first layer (320) on a substrate (300); forming a topographic portion on an upper surface of the first layer (i.e. by providing a topographic contour on underlying 318); and depositing a second layer on the substrate (e.g. 332 is deposited), wherein the topographic portion (i.e. a depression in the underlying layers) is projected through the second layer (332) to form a patterned topographical contour on an upper surface of the second layer (i.e. a depression in the uppermost portion of 332), wherein the patterned topographical contour acts as at least a portion of the target (i.e. the patterned contour acts as an alignment mark target).

4. Claims 1-4, 9, 11, 13,16-19, 23, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Tominaga (US 5,525,840).

Regarding claim 1, the '840 patent discloses a target (i.e. alignment mark) formed on a substrate (2) comprising: a first layer (3) deposited below a second layer (5) on the substrate (2), the second layer (5) deposited below a third layer (6) on the substrate (2), the first layer (3) having a topographic contour formed thereon (i.e. contour formed thereon to create depression in layer 6 for alignment per Fig. 3c), the first layer at least partially projecting a patterned topographical contour (i.e. the etched

away pattern projects a pattern) through the second layer to the third layer (i.e. the indent is formed by a portion of the contour in the first layer being projected from each underlying layer upward).

Regarding claims 2 and 3, the optical characteristics of the patterned portions of both first layer (e.g. 3) and third layer (e.g. 6) "differ" from the portions surrounding the patterned portions, inherently, since the patterned portions can be distinguished optically with alignment optics.

Regarding claim 4, the patterned contour includes a plurality of alternating relatively brighter and relatively darker sections [i.e. there are stripes with bands distinguished by optics as darker and brighter bands, per Fig. 10 with col. 1]

Regarding claim 9, the indentations are aligned in a grid pattern [cover figure], for alignment in an x-y coordinate system.

Regarding claim 11, second layer 5 is titanium nitride, which is "an electrical conductor".

Regarding claim 13, the substrate is a "wafer" with "die" so the substrate is inherently divided into at least one electrically functional portion (i.e. active circuitry) and at least one electrically non-functional portion (e.g. the scribe lines).

Regarding claim 16, the third layer 6 in Fig. 3c has portion that is recessed that forms the alignment mark target.

Regarding claim 17, there are two different heights (e.g. height at bottom of indent and height at top of indent)

Regarding claim 18, there is a central region (i.e. central depression) and a surrounding contrasting portion (i.e. the part that is not a depression).

Regarding claim 19, the contrasting region includes the pattern of the topographical contour.

Regarding claim 23, the '840 patent discloses a method of manufacture of a target (i.e. an optical alignment mark), comprising: depositing a first layer (5) on a substrate (2); forming a topographic portion on an upper surface of the first layer (i.e. by etching a topographic contour on the first layer 3); and depositing a second layer on the substrate (e.g. second layer 5 is deposited), wherein the topographic portion (i.e. a gap-creating depression) is projected through the second layer (5) to form a patterned topographical contour on an upper surface of the second layer (i.e. a depression in the uppermost portion of 5), wherein the patterned topographical contour acts as at least a portion of the target (i.e. the patterned contour acts as an alignment mark target).

Regarding claim 26, the indentations are arranged in a grid (see cover figure and prior art fig. 2c).

5. Claims 1-4, 20 and 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Machinda et al. (US 6,601,314 B2).

Regarding claim 1, the '314 patent discloses a target (i.e. alignment mark) formed on a substrate (10) comprising: a first layer (16) deposited below a second layer (20) on the substrate (10), the second layer (20) deposited below a third layer (26) on the substrate (10), the first layer (16) having a topographic contour formed thereon (i.e. formed thereon by the chosen contour underlying feature 30), the first layer at least

partially projecting a patterned topographical contour through the second layer to the third layer (i.e. the indent is projected from underlying layer 16 upward through layer 20 to layer 26 where the patterned contour appears as indent 30).

Regarding claims 2 and 3, the optical characteristics of the patterned portions of both first layer (e.g. 16) and third layer (e.g. 26) "differ" from the portions surrounding the patterned portions, inherently, since the patterned portions can be distinguished optically with alignment optics.

Regarding claim 4, the patterned contour includes a plurality of alternating relatively brighter and relatively darker sections [see Fig. 3].

Regarding claim 20, the second layer 20 is disclosed as very thin silicon dioxide, which is inherently transparent.

Regarding claim 23, the '314 patent discloses a method of manufacture of a target (i.e. an optical alignment mark), comprising: depositing a first layer (16) on a substrate (10); forming a topographic portion on an upper surface of the first layer (i.e. by etching a gap in 16); and depositing a second layer on the substrate (e.g. layer 20 is deposited), wherein the topographic portion (i.e. a depression in the underlying layers) is projected through the second layer (20) to form a patterned topographical contour on an upper surface of the second layer (i.e. a depression in a portion of 20), wherein the patterned topographical contour acts as at least a portion of the target (i.e. the patterned contour acts as an alignment mark target).

Regarding claims 24 and 25, the light and dark parallel strip bands in Fig. 3 inherently appear in direct or indirect light since the indentations have curved openings.

6. Claims 1-4, 6, 10, 13, 16-19 and 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Weis (US 6,825,096 B2).

Regarding claim 1, the '096 patent discloses a target (i.e. alignment mark) formed on a substrate (24) comprising: a first layer (28) deposited below a second layer (64) on the substrate (24), the second layer (64) deposited below a third layer (66) on the substrate (24), the first layer (28) having a topographic contour formed thereon (i.e. formed thereon by the chosen contour of underlying 318, e.g.), the first layer at least partially projecting a patterned topographical contour through the second layer to the third layer (i.e. the indent is projected from each underlying layer upward).

Regarding claims 2 and 3, the optical characteristics of the patterned portions of both first layer (e.g. 16) and third layer (e.g. 26) "differ" from the portions surrounding the patterned portions, inherently, since the patterned portions can be distinguished optically with alignment optics.

Regarding claim 4, Regarding claim 4, the patterned contour includes a plurality of alternating relatively brighter and relatively darker sections (i.e. sections of varying height that show as lighter and darker portions when viewed in an optics system).

Regarding claim 6, the patterned layer 28 is polysilicon and the contour of patterned layer 28.

Regarding claim 10, the first layer is polysilicon 28 (i.e. a conductor), the second layer 64 is an insulator (e.g. oxide) and the third layer is polysilicon 66 (i.e. a conductor).

Regarding claim 13, the mark is for a "wafer' and this wafer inherently has at least one electrically functional portion (e.g. active circuitry) and at least one electrically non-functional portion (e.g. the alignment mark).

Regarding claim 16, the portions of the third layer between projections 42 are "recessed" (i.e. depressed or indented)

Regarding claim 17, there are two heights of the topographic portion in the third layer 66 (i.e. bottom of depression and mouth of depression).

Regarding claim 18, there is a central region (i.e. central depression) and a surrounding contrasting portion (i.e. the part that is not a depression).

Regarding claim 19, Regarding claim 19, the contrasting region includes the pattern of the topographical contour.

Regarding claim 23, the '096 patent discloses a method of manufacture of a target (i.e. an optical alignment mark), comprising: depositing a first layer (28) on a substrate (24); forming a topographic portion on an upper surface of the first layer (i.e. forming projections 42); and depositing a second layer on the substrate (e.g. layer 64 is deposited), wherein the topographic portion (i.e. projection(s) of the underlying layer(s) 28) is projected through the second layer (64) to form a patterned topographical contour on an upper surface of the second layer (i.e. a depressions in a portion of 66), wherein the patterned topographical contour acts as at least a portion of the target (i.e. the patterned contour acts as an alignment mark target).

Regarding claims 24 and 25, the light and dark parallel strip bands in Fig. 2 inherently appear in direct or indirect light since the indentations have curved openings.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell (US 5,401,691).

Caldwell is silent about a particular embodiment where the alignment mark area patterned topographical contour (i.e. target) includes *a plurality* of *alternating conductors and insulators*.

Caldwell explains, "multiple layers of conductors and insulators are patterned and built upon the other to construct an IC" [col. 1, lines 15; col. 2, lines 3-19].

The alignment mark area patterned topographical contour examples in Caldwell do not specifically include "a plurality of alternating conductors and insulators."

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to include a plurality of alternating conductors and insulators in the alignment mark area of Caldwell, motivated to avoid masking or removal steps for insulating layers such as ILD 336, when formed in a process without CMP, wherein the alignment mark area would not need to be lower than the uppermost plane of the IC [see MPEP 2144].

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caldwell as applied to claim 7 above, and further in view of Stagaman (US 5,563,684).

Caldwell is silent about "width of the die" (blank "die" region 120 on wafer 100).

The '684 patent explains that semiconductor die widths can vary, depending on requirements, yet a width in the range "5 mm to 35 mm" is typical.

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to choose 5 mm as die width since "5 mm" is a typical small die width and is a width compatible with conventional processing [see MPEP 2144].

10. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over any of US 5,401,691, US 5,525,840, or US 6,825,096 B2 as applied to claim 13 above, and further in view of 6,577,020.

The '691, '840, and '096 patents are silent about an alignment mark (i.e. target) being located "at least partially on an electrically functional portion" (taken to mean, e.g., on an active semiconductor die).

The '020 patent explains that placement of the target (i.e. alignment mark) can be advantageously on each active circuitry die, such as for memory.

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to place any alignment mark target on an active die, for reasons explained by Huang ('the '020 patent) at col. 2, lines 31-42).

Allowable Subject Matter

11. Claims 21-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not disclose a target characterized by first, second and third layers, the first layer having a patterned topographical contour that is at least partially projected through the second layer to the third layer, wherein a barrier layer is disposed above the second layer and an orifice plate is disposed above the barrier layer.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Evan Pert whose telephone number is 571-272-1969. The examiner can normally be reached on M-F (7:30AM-3:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ETP
September 27, 2006

EVAN PERT
PRIMARY EXAMINER